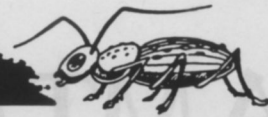


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of various species emerge and burrow into the soil to lay eggs. Hatching and appearance of young larvae occur during July and August.

Extreme heat and drought during the summer may cause some grubs to move deeper in the soil. Under such conditions, irrigation several hours before treatment and a thorough soaking afterward is advisable.

Black turfgrass atenius—Eggs laid by beetles during May hatch in June and the larvae immediately begin feeding on the turf roots and thatch.

From late June to mid-July, symptoms of injury include wilting in spite of irrigation. In July, larvae move deep into the soil, pupate and emerge as adults. These adults lay eggs during August producing a second generation in states such as Ohio. The second generation larvae are capable of damaging turf.

Sod webworms—Damage from sod webworm larvae occurs occasionally in most of the cool-season turf region. Injury is more common in midwestern states and is usually seen in July and August. Older sod fields and heavily thatched turfs are good candidates for infestation. There are generally one or two generations per year, depending upon the species.

Cutworms—Cutworm larvae continue to cause damage to golf course greens from June through August. These larvae pupate in the soil or

thatch and emerge as moths that lay eggs for additional generations.

Fall armyworm—The fall armyworm is seldom a problem of cool-season turf.

Greenbug—Damaging populations of greenbug can occur from June through August. Populations and incidents of damage frequently vary from area to area even within a city.

Symptoms of injury include turf under the dripline of trees and in open areas having a burnt orange color. When symptoms are seen, numerous aphids (40 or more) may be seen on a single grass blade. Close examination of damaged turf is necessary because the aphids are small. If left untreated, a heavy infestation can kill the turf.

Chinch bugs—In the northern U.S. the second generation of chinch bug is at peak numbers in September. Nymphs complete their development to adults in late October. Most chinch bugs overwinter in the turf, but some move to protected areas before winter.

Generally, infestation levels at this time are not high enough to warrant the use of insecticides. Early fall rains and infection by a parasitic fungus (*Beauveria spp.*) usually provide sufficient control.

Billbugs—During September billbug adults that developed from summer larvae are often seen wandering about on sidewalks, driveways or

other paved surfaces. Before winter, these adults seek shelter in thatch, along sidewalk edges or near foundations and overwinter there. Many, if not most, overwinter in turf.

In some areas (Cincinnati, Ohio) a partial second generation may occur. Larvae of this generation have been known to cause visible damage in September and October.

Grubs—Most species of grubs are in the third of their three stages of development and are feeding actively. When soil temperatures decrease in late October, the larvae burrow deeper into the soil to overwinter. Severely cold winters have little effect on survival.

Black turfgrass atenius—By September, adults of the current generation begin to fly into protected areas, such as golf course roughs, to overwinter. Larvae that have not completed development to adults before frost are killed.

Sod webworm—Northern sod webworm larvae are small and cause little if any damage in the fall. Late in the fall the larvae construct a cocoon-like shelter in which they overwinter.

Greenbug—Severe infestations of greenbug have been known to occur as late as the first week of December. Areas having a history of infestation should be re-examined when mild temperatures extend late into the fall. Heavily infested turf will not survive through winter.

WARM SEASON

Late Winter (March)

Chinch bugs and billbugs—In southern Florida, the southern chinch bug is active throughout the year. In other southern areas, chinch bugs and billbugs become active during warm days in late winter. Most varieties of St. Augustinegrass and some bermudagrass are more likely to be infested by chinch bugs. Zoysia and bermudagrasses may be attacked by the hunting billbug.

When summer damage from chinch bugs and/or billbugs is expected, treatment controls adults before eggs are laid. If spring is early, these applications may be needed as early as mid-March. During a late spring, applications may need to be delayed until the last week of March.

However, in most cases, treatment

can be delayed until damage signs first appear in June. Retreatment for chinch bugs in middle to late summer may be necessary if reinfestation from adjacent untreated areas occurs.

Preventative treatments may not be successful in southern Florida where the southern chinch bug has multiple generations and is resistant to most organophosphate insecticides in some areas. Replacing susceptible turf with Floratam St. Augustinegrass, a variety resistant to the southern chinch bug, or non-host grasses, will usually provide excellent natural control in Florida. However, reports of chinch bugs feeding on Floratam continue to increase in south Florida.

Grubs—The larvae of this group of pests normally overwinter six inches

or deeper in the soil. If spring comes early, grub activity can be expected along with skunks and raccoons who will tear up the turf searching for the grubs. Moles, who feed on grubs and earthworms, also become active at this time.

Mole crickets—Mole crickets have extended their range from Florida and eastern Georgia into southern Louisiana, eastern Texas and up the East Coast into the Carolinas. Timing of treatments is critical and varies from one area to another.

The tawny and southern mole crickets are the primary pest species. Except for southern Florida, both have one generation per year. Mole crickets become active in March from north central Florida throughout their range in the Gulf States after overwin-



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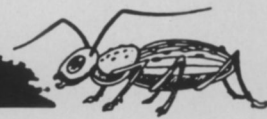


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INSECT CONTROL GUIDE



tering in the ground as adults or nymphs. Tunneling damage takes place at night in moist soil and increases as mole crickets become more active. Both mole cricket species begin spring mating flights in late March. In most areas, March treatment is seldom required.

In years when tunneling of overwintered mole crickets resumes earlier than normal, treatment has been used with some success. Generally, such applications are better made later in the year when young nymphs are present. Rolling, fertilizing as recommended, and irrigation help keep grass roots in contact with the soils and growing in areas where tunneling damage is observed.

Spring (April-May)

Chinch bugs and billbugs—As warm days of spring approach, movement of chinch bug and billbug adults increases rapidly. Generally, egg laying begins the first week of April on warm-season turf. Occasionally adult billbugs can be seen wandering about sidewalks on warm afternoons.

Generally, application of insecticides to prevent buildup of chinch bug and billbug populations should be completed by mid-April in the South. Such applications are made before significant numbers of eggs are laid. This time may vary as much as a week or more depending upon the spring weather. When this approach is not used and southern chinch bugs are detected in May, treatment provides control. In areas with three to five chinch bug generations, turf surrounded by infested, untreated host plants may require one or two retreatments at six week intervals.

Grubs—Overwintered grubs return to the surface and begin feeding on turfgrass roots in early April. Increased activity and damage from birds, moles, skunks, armadillos and raccoons foraging on grubs can also be expected. Feeding by birds, other animals and grubs continues through April.

Infestations of such grubs can also be controlled during early April by spot or general treatment. Treatment should be delayed until grubs are in the top one-inch of soil. Irrigation or rainfall should follow such applications. Although milky spore disease products for control of Japanese beetle grubs may be applied anytime there is no frost in the soil, spring is a good time for such applications in areas where Japanese beetle grubs are nu-

merous. The soil is open and frequent rains move the disease spores into the soil and thatch. It should be noted that only the Japanese beetle grub will be affected by milky spore.

Mole crickets—Damage increases in April from north central Florida throughout the southern areas of the Gulf States. Mating and dispersal flights continue as egg laying and hatching begin.

Early spring treatment may be necessary in areas that were severely damaged last fall, if overwintered mole crickets are still present. Small damaged areas can be rolled or otherwise packed down so that the turf roots are reconnected with the soil. Early spring damage is due primarily to tunneling. Mole cricket feeding at this time is minimal.

To determine cricket presence, pour soapy water (2 oz. liquid dishwashing detergent in one gallon of water) on turf areas where infestation is suspected. Crickets will usually surface in three to 15 minutes (longer in cool weather).

Infested areas should be monitored weekly by soap flushes to determine the presence and abundance of newly hatched mole cricket nymphs. Nymphs usually hatch in central Florida during April and May. Farther north and west hatching begins in May and continues through June. Residual treatments and treatments with toxic baits should be made when nymphs are present.

Sod webworms—Overwintered larvae of the sod webworm begin feeding as soon as the grass begins to grow. Usually damage is insignificant, but areas that do not green up may be infested. These areas frequently have probe holes from starlings feeding on the larvae.

In warm-season areas webworm larvae pupate during late March and early April. Moth flights begin in April in southernmost areas.

Young larvae are usually present about two weeks after the spring moth flight peaks, so treatment of young larvae can be done in May in some areas.

Damage from the burrowing sod webworm may be evident in late May in the South. Rubbing a hand over turf suspected of being infested exposes larval burrows that are covered with a web flap and grass clippings.

When necessary, a wide range of insecticides may be used to achieve control.

Cutworms—Moths of cutworms begin laying eggs on golf course

greens and other turf areas in the spring. These eggs hatch producing larvae that feed on grass blades during the night.

While visible damage is uncommon on home lawns, damage can be significant on golf course greens in May.

Black, granulate and variegated cutworm moths become active in March and April in the South. Larvae are present on turf, especially on golf greens and tees. Damage can become evident as early as mid-April. By May, the larvae are large enough to cause severe damage.

The principle of controlling these pests is to apply an insecticide late in the afternoon and allow night feeding cutworms to contact and feed on the treated foliage. Irrigation following liquid application is therefore not advisable unless specified on the product label.

Fire ants—Fire ants are spreading across much of the South. These ants inflict painful stings to man and animals, making them more a "people problem" than a grass problem. They begin establishing new mounds during warm, wet days of spring. During this time, ants are active near the surface of mounds and workers are actively foraging for food.

New mounds may not be visible above the turf surface at this time. Areas heavily infested with old mounds and the less-visible new mounds can be treated broadcast. Individual mound treatments can be made in less infested areas or in areas that are re-infested as the season progresses.

Read the label for specific directions for mound treatment. Do not disturb the mound before or during treatment.

Summer (June-August)

Chinch bugs and billbugs—Southern chinch bugs are not usually a problem in well-irrigated turf or during summers when rainfall is plentiful. Southern chinch bug-damage first appears during the dry periods of June and July. Damage may continue throughout the summer and into the fall because of overlapping generations.

A wide range of insecticides may be used at label rates to control existing infestations. Floratam St. Augustine, a chinch bug resistant variety, has been a primary turf variety grown in more southern coastal areas and Florida where southern chinch bug is a problem. However,

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The development of a mole cricket from nymph to adult.

reports indicate that chinch bug feeding has occurred on Floratam in some locations in south Florida.

Billbug grubs are usually large enough to be found in the soil by late June and July. Areas of turf where adult billbug activity has been observed earlier should be examined routinely. Zoysia and bermudagrasses are especially susceptible to infestation. Turf that does not hold together, does not respond to fertilization normally or appears to be drought-stressed in spite of irrigation may be infested. If drought conditions exist, water prior to treatment as well as afterwards.

Grubs—Beetle flights continue and often peak in June, although the time flights occur varies from year to year. Japanese beetle flights occur mainly from middle to late May and June. Brown May or June beetle flights often follow heavy rains in late May and June. New generation grubs of most southern species can be found by mid-August.

Infestations of new generation grubs are present in late July or August. Extreme heat and drought during the summer may cause some grubs to move deeper in the soil. Under such conditions, irrigation several hours before treatment and a thorough soaking afterward is advisable.

Mole crickets—Egg laying diminishes in late June, and newly-hatched nymphs of both species feed voraciously. Tunneling damage suddenly becomes obvious in July as the nymphs grow larger. Because of the potential for sudden damage at this time, turf areas should be inspected several times a week during this period.

Bait formulations are effective in controlling mole cricket nymphs from June through August in the area from central Florida north and west

through the gulf states. Baits work best in eastern Georgia during spring and fall. Bait applications usually must be repeated one or more times.

Mole crickets are more active at night in moist soil. Turf should be irrigated several hours before baits are applied. Delay application until later in the day, and do not irrigate for two to three days thereafter.

Residual control of mole crickets may vary with location, irrigation and amount of rainfall. In some cases, Oftanol has not performed as effectively as expected, nor as consistently as it once did in these same locations. Oftanol and other residual controls work most effectively on younger mole cricket nymphs when treatments are watered immediately. Fewer residual treatments can be used as outbreaks occur, but usually have to be repeated several times.

Sod webworms—Most sod webworms complete at least three generations a year with overlapping generations toward the end of the season.

Damage is most severe from late June through August. In southern Florida where the tropical sod webworm is active throughout the year, damage is most severe in late summer and fall.

Hybrid bermudagrasses are favored by sod webworms, but damage occurs on other warm season grasses. Webworm damage to bermudagrass often superficially resembles symptoms of some diseases. Flushes of soapy water can be used to determine the presence of sod webworm larvae.

Insecticide applications should be made when larvae are present and/or one to two weeks after peak moth flights from infested turf.

Retreatment may be necessary depending upon the location and number of generations.

Fall armyworm—In the South, summer always means the arrival of the moths of this migratory pest. Although in mild winters fall armyworms may overwinter along the Gulf Coast, it is generally believed that the moths are blown in on winds from Central and South America. Several generations occur each season, one about every five weeks. Generations overlap in the fall.

Lush, green bermudagrasses are preferred. By late June, fall armyworm damage to turf has usually been reported along the Gulf Coast. Damage is seldom permanent, unless drought and/or heat stress follow.

Fall armyworms may feed anytime during the day but are most active in the early morning and late evening.

Treatment is most effective at these times. During hot, mid-day hours, larvae may retreat into the thatch.

Fire ants—Fire ants are more difficult to control during hot, summer days because they are deeper in the soil. However, during rainy periods, they may become active and establish new mounds. Treatments during these months should be applied early in the morning before the heat of the day. Treat mounds as they appear.

Scale insects—Although Rhodegrass scale is present in Gulf Coast areas throughout the year, damage becomes most pronounced during the hot, dry days of summer. Bermudagrass and St. Augustinegrass are preferred hosts, but other grasses are also infested. Repeated treatments are required for control to be effective.

Ground pearls are scale insects that live in the soil throughout the year, sometimes eight to 10 inches deep. In the spring, eggs hatch producing nymphs that feed throughout the summer by piercing turf roots and extracting plant fluids.

Chemical control for ground pearls has not been effective at any time of year. Damage is most severe during summer months when the turf is stressed from heat and drought.

Centipedegrass is especially susceptible to damage, particularly when weakened by over-fertilization or drought. Proper fertilization, disease control and adequate irrigation to maintain healthy turf is the best defense.

Fall (Sept.-Oct.)

Chinch bugs—Damage by the southern chinch bug may continue in untreated areas. Late summer appli-

